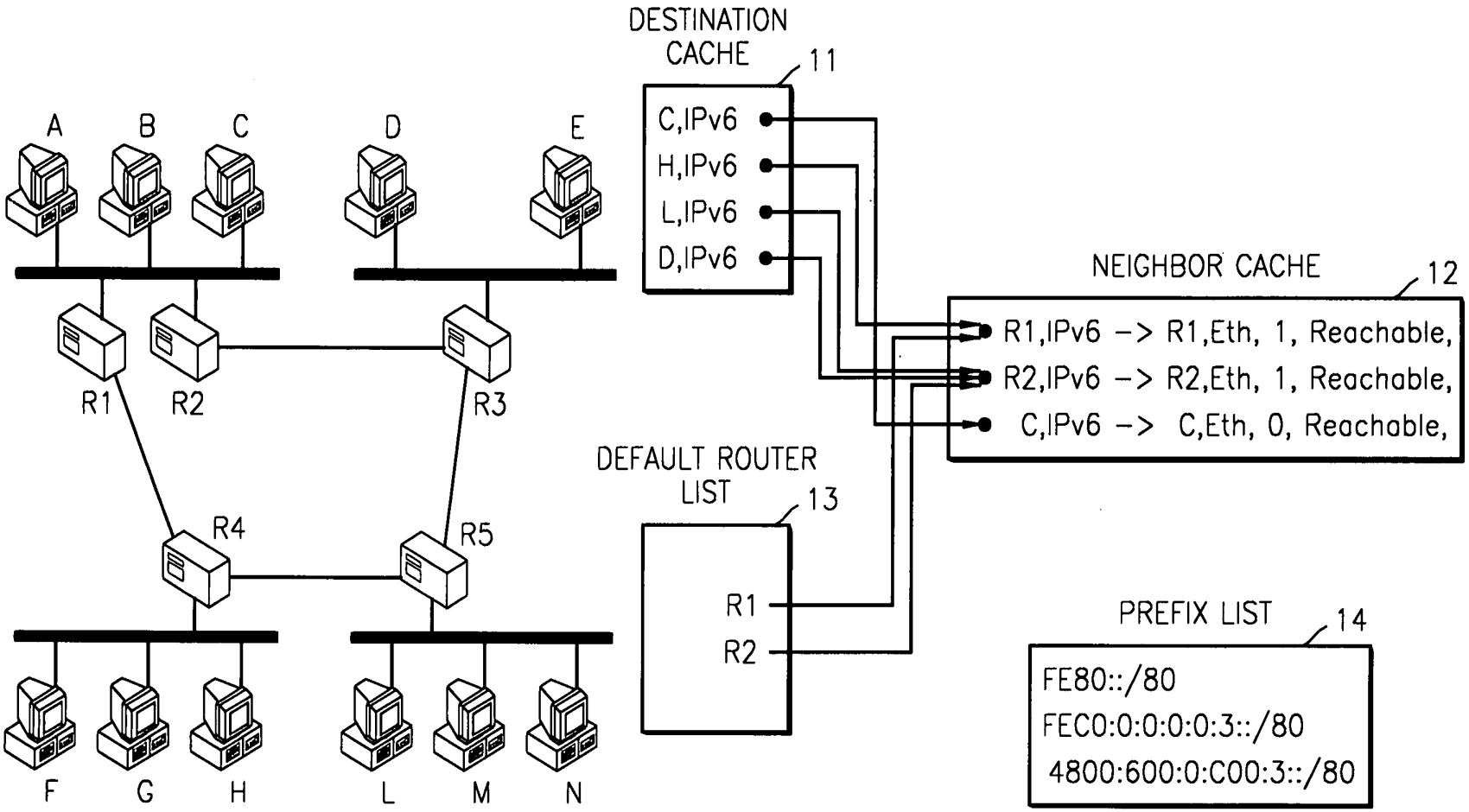
FIG. 1 (PRIOR ART)



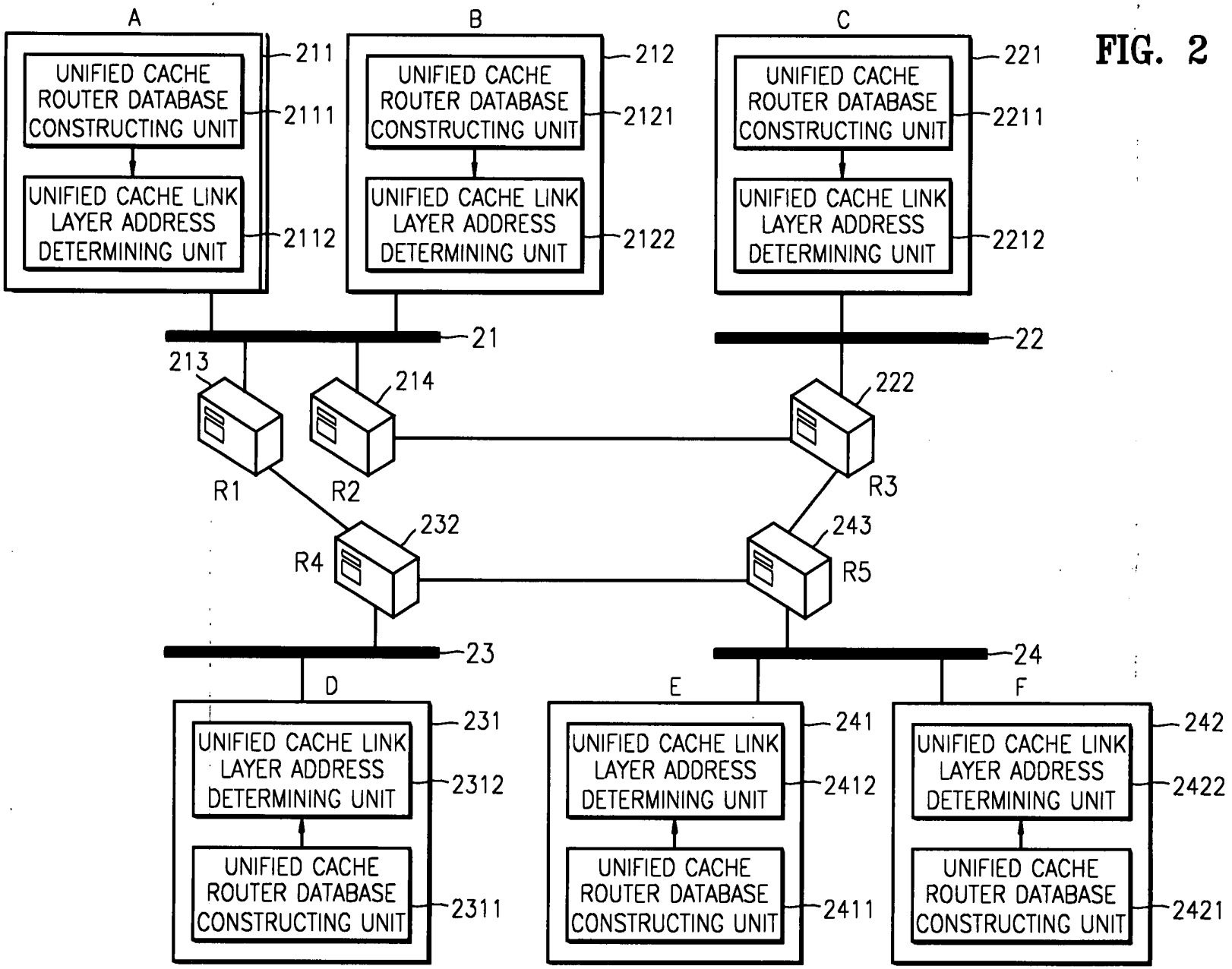

A
B
C
211
212
221
UNIFIED CACHE ROUTER DATABASE CONSTRUCTING UNIT
2111
2121
2211
UNIFIED CACHE LINK LAYER ADDRESS DETERMINING UNIT
2112
2122
2212
21
22
213
214
222
R1
R2
R3
232
243
R4
R5
23
24
D
E
F
231
241
242
2312
2412
2422
2311
2411
2421

FIG. 2

FIG. 3

NETWORK LAYER ADDRESS	PREFIX LENGTH	LINK LAYER ADDRESS	ONLINK	ROUTER	REACHABILITY	MTU	INTERFACE ID
⋮							
NETWORK LAYER ADDRESS	PREFIX LENGTH	LINK LAYER ADDRESS	ONLINK	ROUTER	REACHABILITY	MTU	INTERFACE ID
NETWORK LAYER ADDRESS	PREFIX LENGTH	LINK LAYER ADDRESS	ONLINK	ROUTER	REACHABILITY	MTU	INTERFACE ID
NETWORK LAYER ADDRESS	PREFIX LENGTH	LINK LAYER ADDRESS	ONLINK	ROUTER	REACHABILITY	MTU	INTERFACE ID
NETWORK LAYER ADDRESS	PREFIX LENGTH	LINK LAYER ADDRESS	ONLINK	ROUTER	REACHABILITY	MTU	INTERFACE ID
NETWORK LAYER ADDRESS	PREFIX LENGTH	LINK LAYER ADDRESS	ONLINK	ROUTER	REACHABILITY	MTU	INTERFACE ID
⋮							
NETWORK LAYER ADDRESS	PREFIX LENGTH	LINK LAYER ADDRESS	ONLINK	ROUTER	REACHABILITY	MTU	INTERFACE ID

FIG. 4

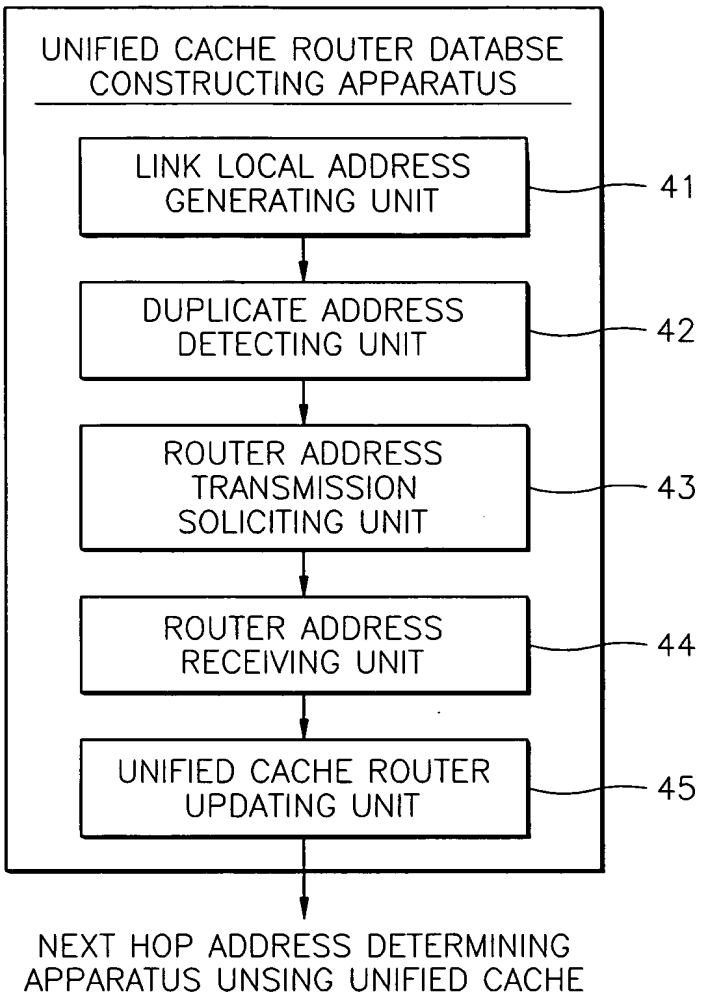

UNIFIED CACHE ROUTER DATABSE CONSTRUCTING APPARATUS
LINK LOCAL ADDRESS GENERATING UNIT
41
DUPLICATE ADDRESS DETECTING UNIT
42
ROUTER ADDRESS TRANSMISSION SOLICITING UNIT
43
ROUTER ADDRESS RECEIVING UNIT
44
UNIFIED CACHE ROUTER UPDATING UNIT
45
NEXT HOP ADDRESS DETERMINING APPARATUS UNSING UNIFIED CACHE

FIG. 5

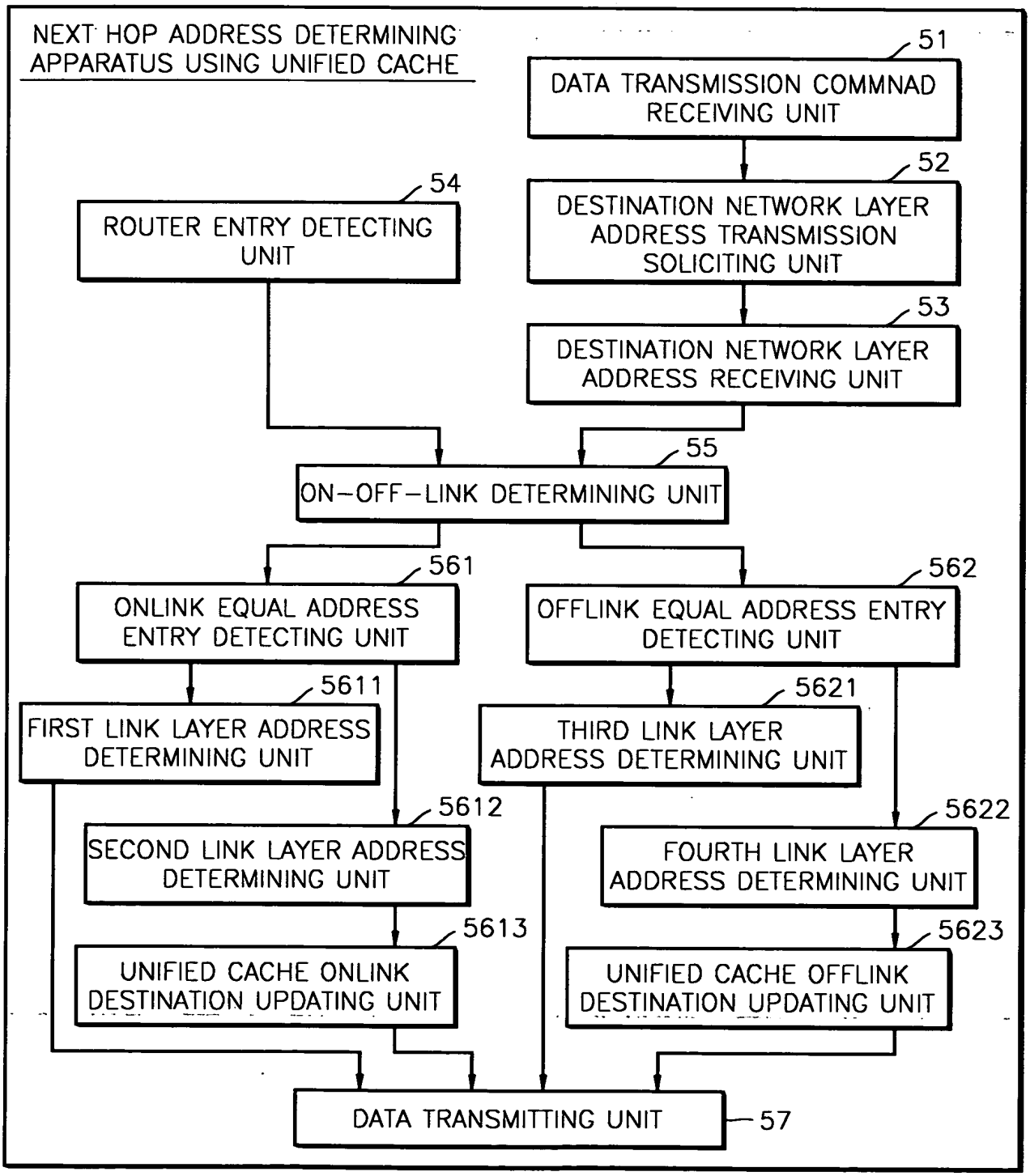

NEXT HOP ADDRESS DETERMINING APPARATUS USING UNIFIED CACHE
51
DATA TRANSMISSION COMMNAD RECEIVING UNIT
52
DESTINATION NETWORK LAYER ADDRESS TRANSMISSION SOLICITING UNIT
53
DESTINATION NETWORK LAYER ADDRESS RECEIVING UNIT
54
ROUTER ENTRY DETECTING UNIT
55
ON-OFF-LINK DETERMINING UNIT
561
ONLINK EQUAL ADDRESS ENTRY DETECTING UNIT
562
OFFLINK EQUAL ADDRESS ENTRY DETECTING UNIT
5611
FIRST LINK LAYER ADDRESS DETERMINING UNIT
5621
THIRD LINK LAYER ADDRESS DETERMINING UNIT
5612
SECOND LINK LAYER ADDRESS DETERMINING UNIT
5622
FOURTH LINK LAYER ADDRESS DETERMINING UNIT
5613
UNIFIED CACHE ONLINK DESTINATION UPDATING UNIT
5623
UNIFIED CACHE OFFLINK DESTINATION UPDATING UNIT
DATA TRANSMITTING UNIT
57

FIG. 6

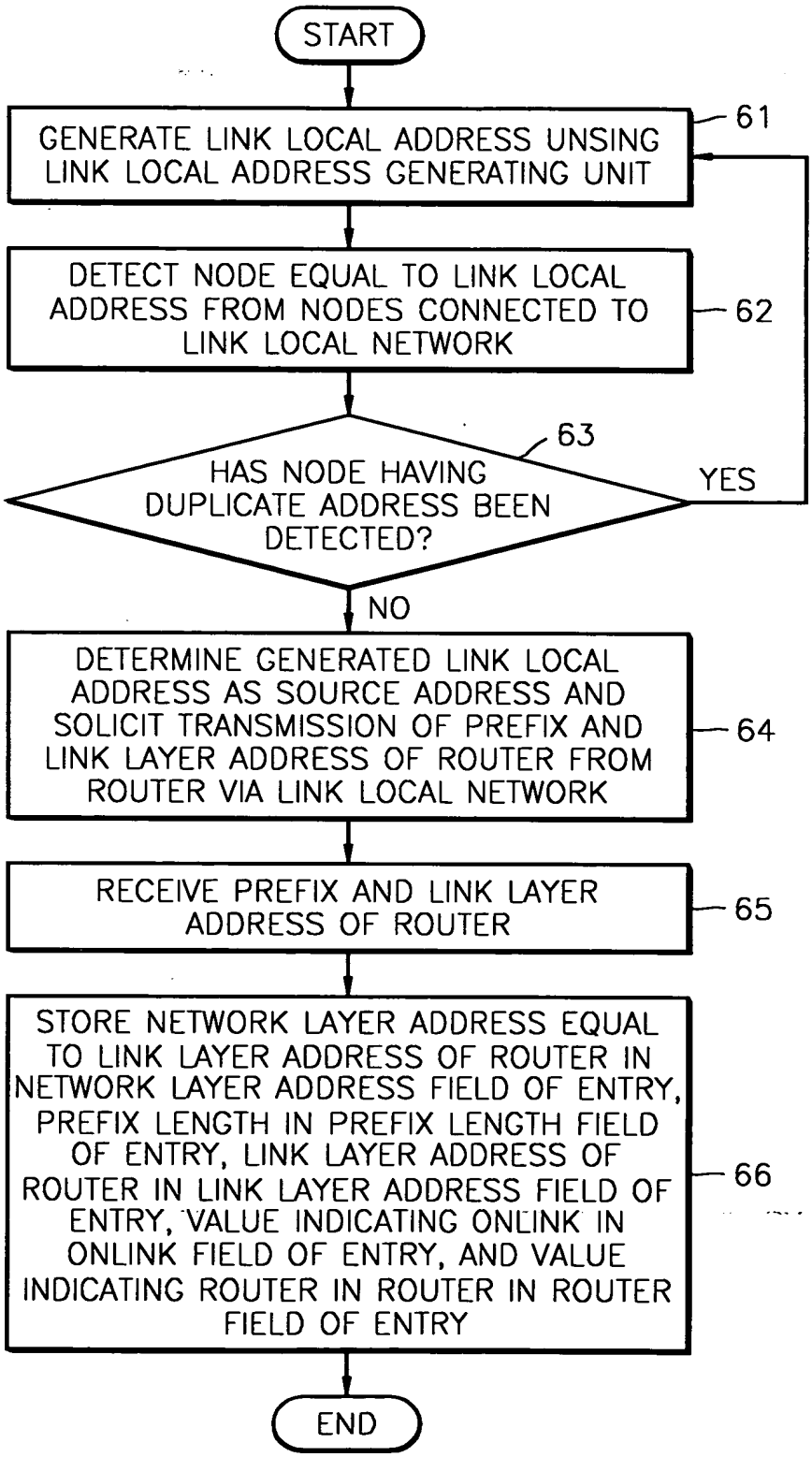

START
GENERATE LINK LOCAL ADDRESS UNSING LINK LOCAL ADDRESS GENERATING UNIT
61
DETECT NODE EQUAL TO LINK LOCAL ADDRESS FROM NODES CONNECTED TO LINK LOCAL NETWORK
62
63
HAS NODE HAVING DUPLICATE ADDRESS BEEN DETECTED?
YES
NO
DETERMINE GENERATED LINK LOCAL ADDRESS AS SOURCE ADDRESS AND SOLICIT TRANSMISSION OF PREFIX AND LINK LAYER ADDRESS OF ROUTER FROM ROUTER VIA LINK LOCAL NETWORK
64
RECEIVE PREFIX AND LINK LAYER ADDRESS OF ROUTER
65
STORE NETWORK LAYER ADDRESS EQUAL TO LINK LAYER ADDRESS OF ROUTER IN NETWORK LAYER ADDRESS FIELD OF ENTRY, PREFIX LENGTH IN PREFIX LENGTH FIELD OF ENTRY, LINK LAYER ADDRESS OF ROUTER IN LINK LAYER ADDRESS FIELD OF ENTRY, VALUE INDICATING ONLINK IN ONLINK FIELD OF ENTRY, AND VALUE INDICATING ROUTER IN ROUTER IN ROUTER FIELD OF ENTRY
66
END

FIG. 7

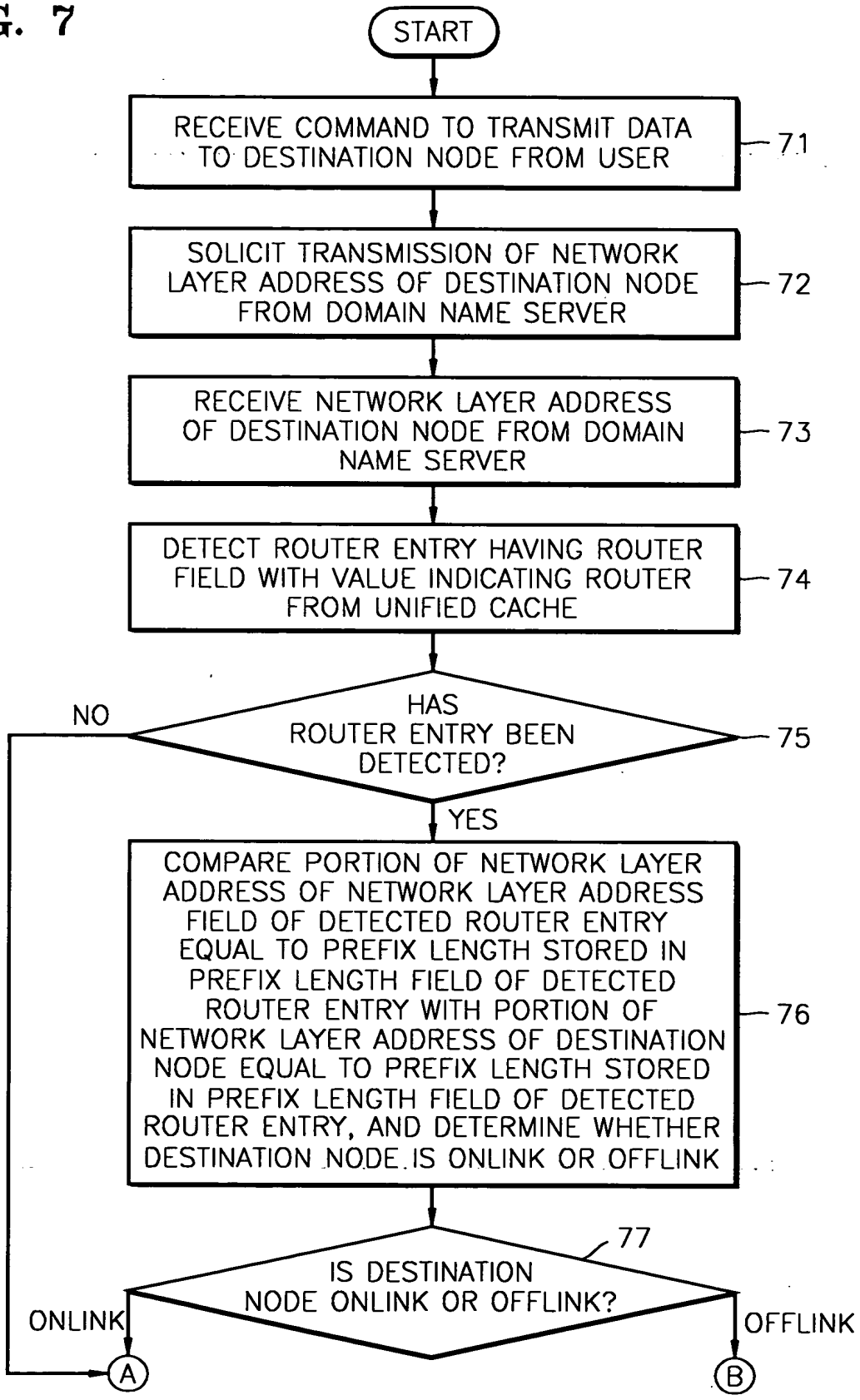

START
RECEIVE COMMAND TO TRANSMIT DATA TO DESTINATION NODE FROM USER
71
SOLICIT TRANSMISSION OF NETWORK LAYER ADDRESS OF DESTINATION NODE FROM DOMAIN NAME SERVER
72
RECEIVE NETWORK LAYER ADDRESS OF DESTINATION NODE FROM DOMAIN NAME SERVER
73
DETECT ROUTER ENTRY HAVING ROUTER FIELD WITH VALUE INDICATING ROUTER FROM UNIFIED CACHE
74
HAS ROUTER ENTRY BEEN DETECTED?
75
NO
YES
COMPARE PORTION OF NETWORK LAYER ADDRESS OF NETWORK LAYER ADDRESS FIELD OF DETECTED ROUTER ENTRY EQUAL TO PREFIX LENGTH STORED IN PREFIX LENGTH FIELD OF DETECTED ROUTER ENTRY WITH PORTION OF NETWORK LAYER ADDRESS OF DESTINATION NODE EQUAL TO PREFIX LENGTH STORED IN PREFIX LENGTH FIELD OF DETECTED ROUTER ENTRY, AND DETERMINE WHETHER DESTINATION NODE IS ONLINK OR OFFLINK
76
IS DESTINATION NODE ONLINK OR OFFLINK?
77
ONLINK
OFFLINK
A
B

FIG. 8

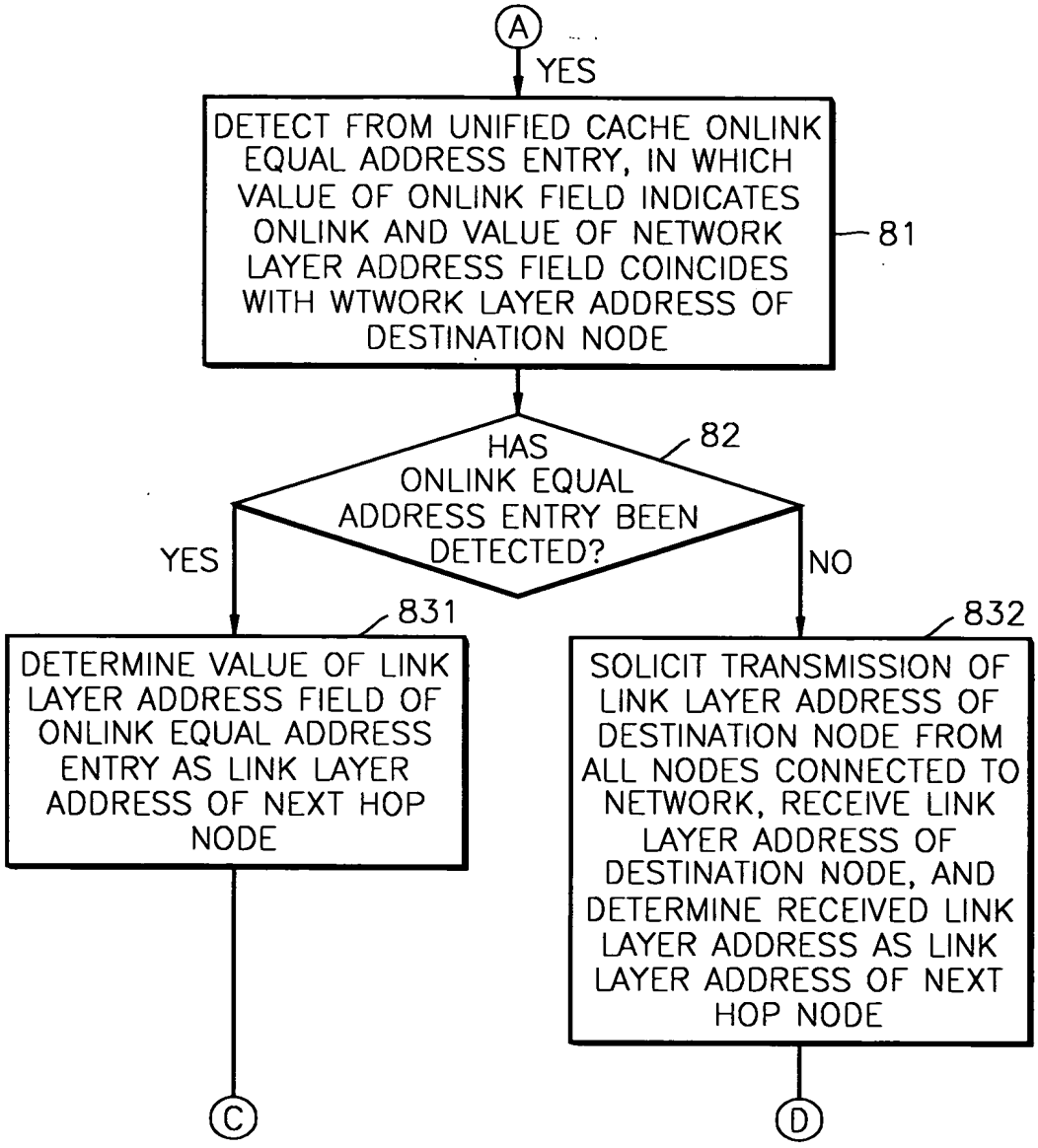

A
YES
DETECT FROM UNIFIED CACHE ONLINK EQUAL ADDRESS ENTRY, IN WHICH VALUE OF ONLINK FIELD INDICATES ONLINK AND VALUE OF NETWORK LAYER ADDRESS FIELD COINCIDES WITH WTWORK LAYER ADDRESS OF DESTINATION NODE
81
HAS ONLINK EQUAL ADDRESS ENTRY BEEN DETECTED?
82
YES
NO
831
DETERMINE VALUE OF LINK LAYER ADDRESS FIELD OF ONLINK EQUAL ADDRESS ENTRY AS LINK LAYER ADDRESS OF NEXT HOP NODE
832
SOLICIT TRANSMISSION OF LINK LAYER ADDRESS OF DESTINATION NODE FROM ALL NODES CONNECTED TO NETWORK, RECEIVE LINK LAYER ADDRESS OF DESTINATION NODE, AND DETERMINE RECEIVED LINK LAYER ADDRESS AS LINK LAYER ADDRESS OF NEXT HOP NODE
C
D

FIG. 8

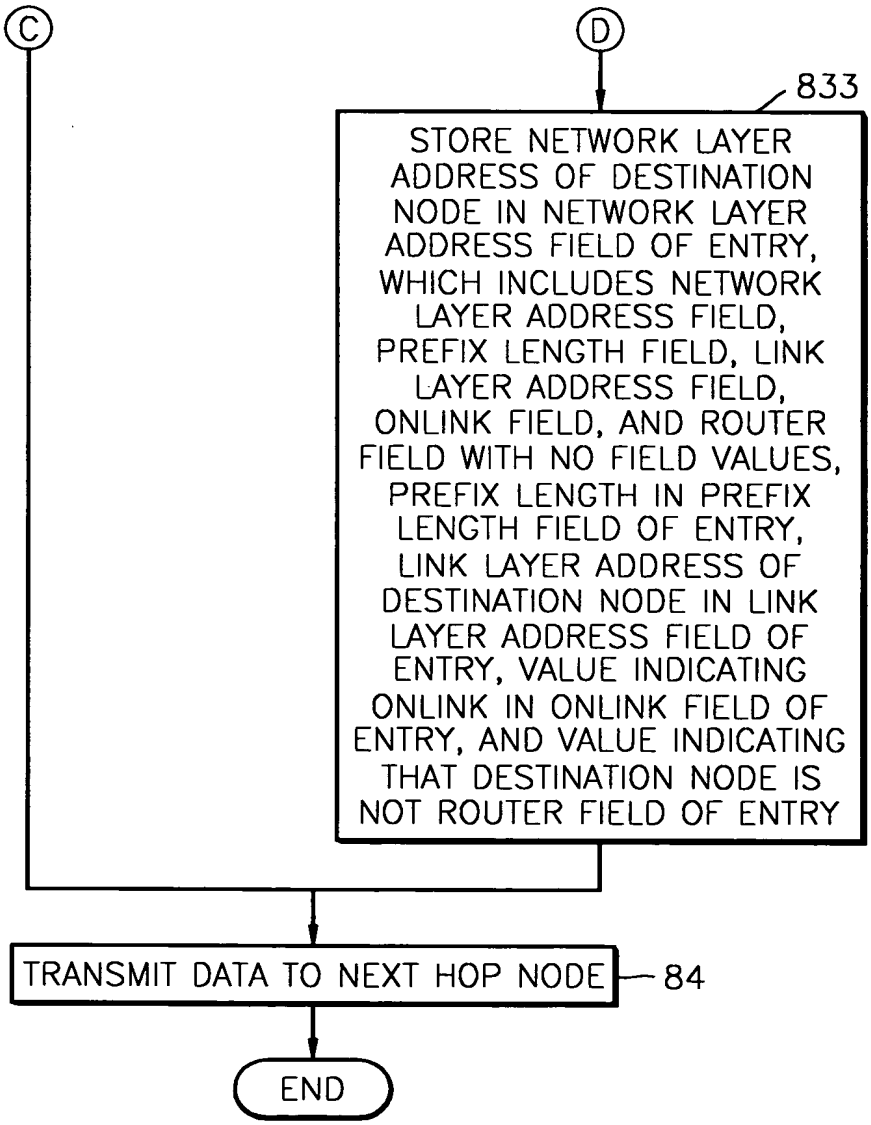

C
D
833
STORE NETWORK LAYER ADDRESS OF DESTINATION NODE IN NETWORK LAYER ADDRESS FIELD OF ENTRY, WHICH INCLUDES NETWORK LAYER ADDRESS FIELD, PREFIX LENGTH FIELD, LINK LAYER ADDRESS FIELD, ONLINK FIELD, AND ROUTER FIELD WITH NO FIELD VALUES, PREFIX LENGTH IN PREFIX LENGTH FIELD OF ENTRY, LINK LAYER ADDRESS OF DESTINATION NODE IN LINK LAYER ADDRESS FIELD OF ENTRY, VALUE INDICATING ONLINK IN ONLINK FIELD OF ENTRY, AND VALUE INDICATING THAT DESTINATION NODE IS NOT ROUTER FIELD OF ENTRY
TRANSMIT DATA TO NEXT HOP NODE
84
END

FIG. 9

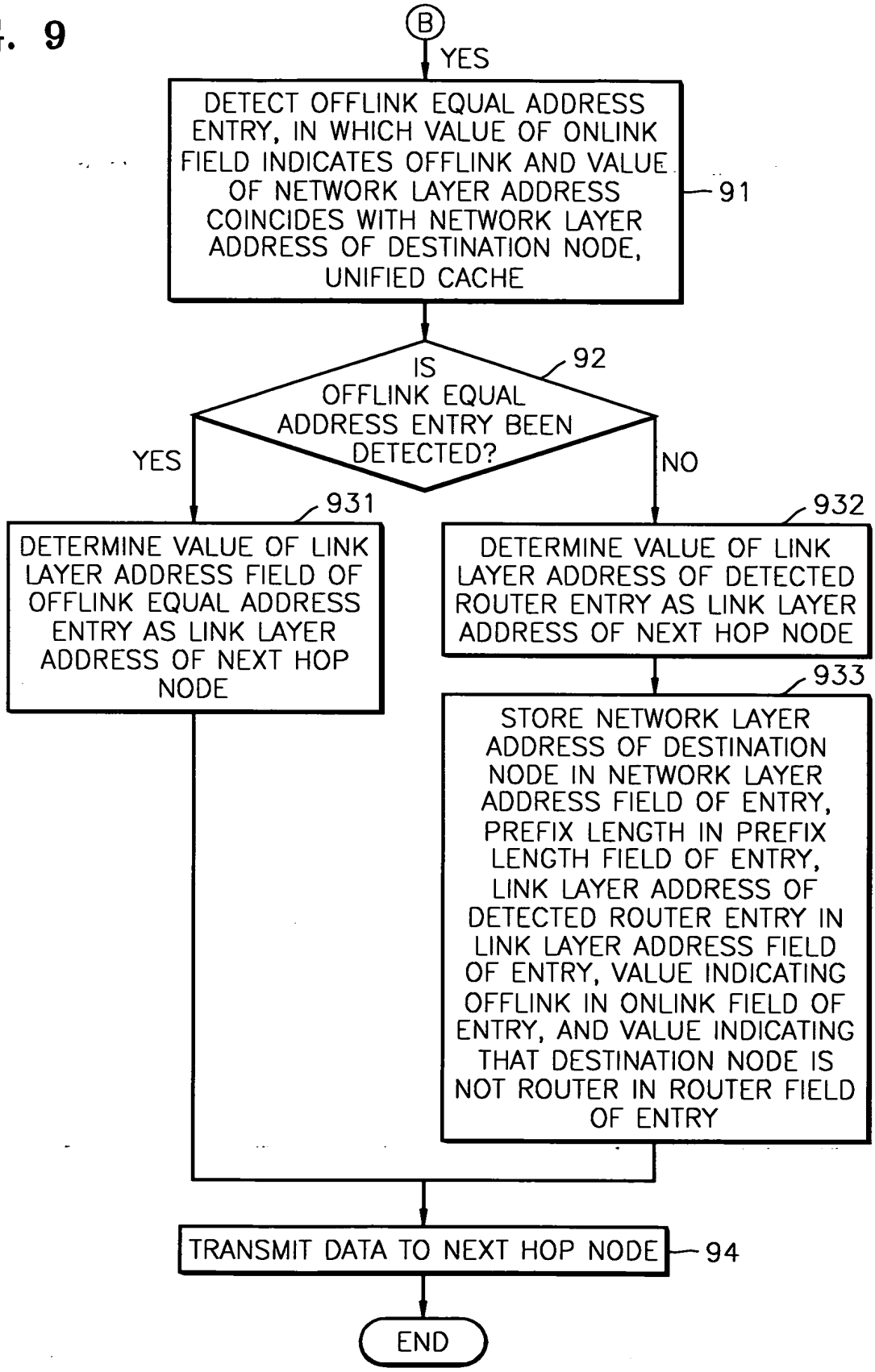
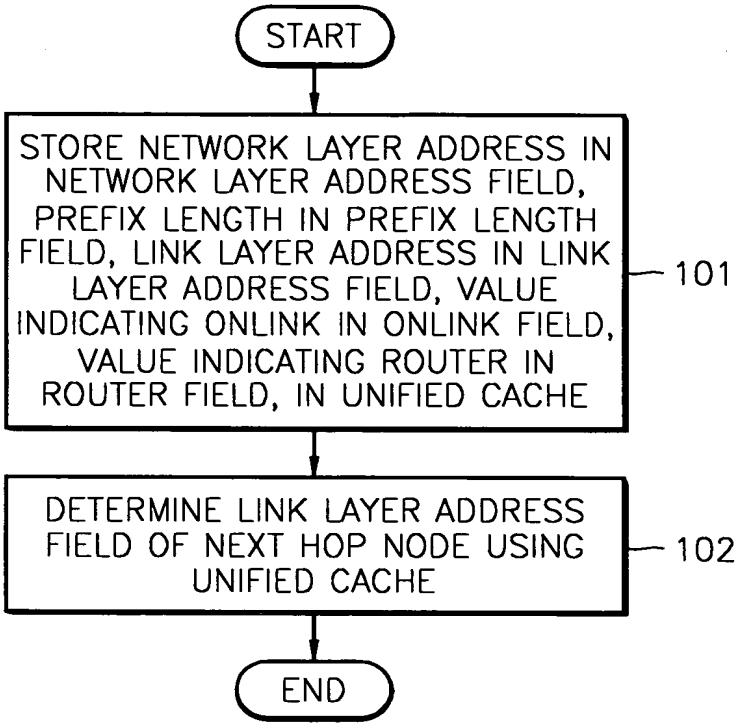

B
YES
DETECT OFFLINK EQUAL ADDRESS ENTRY, IN WHICH VALUE OF ONLINK FIELD INDICATES OFFLINK AND VALUE OF NETWORK LAYER ADDRESS COINCIDES WITH NETWORK LAYER ADDRESS OF DESTINATION NODE, UNIFIED CACHE
91
IS OFFLINK EQUAL ADDRESS ENTRY BEEN DETECTED?
92
YES
NO
931
DETERMINE VALUE OF LINK LAYER ADDRESS FIELD OF OFFLINK EQUAL ADDRESS ENTRY AS LINK LAYER ADDRESS OF NEXT HOP NODE
932
DETERMINE VALUE OF LINK LAYER ADDRESS OF DETECTED ROUTER ENTRY AS LINK LAYER ADDRESS OF NEXT HOP NODE
933
STORE NETWORK LAYER ADDRESS OF DESTINATION NODE IN NETWORK LAYER ADDRESS FIELD OF ENTRY, PREFIX LENGTH IN PREFIX LENGTH FIELD OF ENTRY, LINK LAYER ADDRESS OF DETECTED ROUTER ENTRY IN LINK LAYER ADDRESS FIELD OF ENTRY, VALUE INDICATING OFFLINK IN ONLINK FIELD OF ENTRY, AND VALUE INDICATING THAT DESTINATION NODE IS NOT ROUTER IN ROUTER FIELD OF ENTRY
TRANSMIT DATA TO NEXT HOP NODE
94
END

FIG. 10


START
STORE NETWORK LAYER ADDRESS IN NETWORK LAYER ADDRESS FIELD, PREFIX LENGTH IN PREFIX LENGTH FIELD, LINK LAYER ADDRESS IN LINK LAYER ADDRESS FIELD, VALUE INDICATING ONLINK IN ONLINK FIELD, VALUE INDICATING ROUTER IN ROUTER FIELD, IN UNIFIED CACHE
101
DETERMINE LINK LAYER ADDRESS FIELD OF NEXT HOP NODE USING UNIFIED CACHE
102
END